

# Tornado!

• The city having the most tornados? You guessed it! Oklahoma City, with over 100!

## Weird Weather Week

In a state that averages 26 tornados annually, this tornado was but one of 88 that swept through Missouri during a seven-day period in the spring of 2003. How could such a week happen?

Michael Hudson, meteorologist at the National Weather Service (NWS) office in Pleasant Hill, MO, says that the storm system on May 4 “was a textbook weather system. If you . . . were to draw up a weather map and put in all the elements that you need for severe weather—an extremely strong **jet stream**, lots of available heat and humidity from the Gulf of Mexico, cold air moving down from the northern plains and meeting up with this warm, juicy air over the area—all of these came together on May 4.”

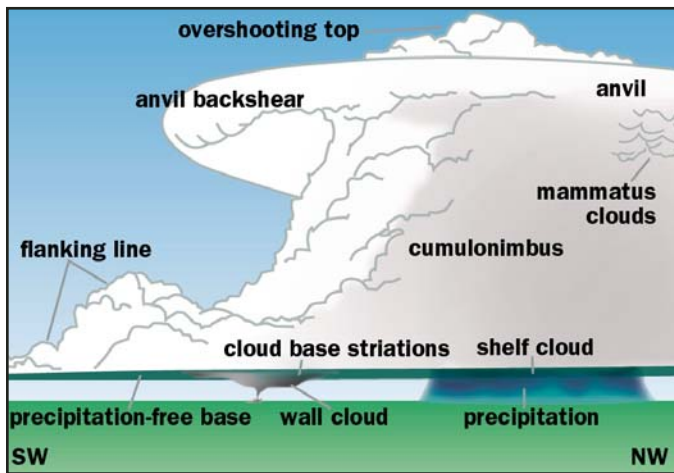
In fact, the NWS at Pleasant Hill was talking about the possibility of severe weather for several days prior to the tornado outbreak, and the Storm Prediction Center in Norman, OK, forecasted severe weather for much of the country. According to Hudson, on May 3 “they even listed specific cities. It was that clear-cut . . . that it was going to be a huge severe weather day.”

## Anatomy of a Tornado

A *tornado* is a violently whirling column of wind that extends from the Earth’s surface to the base of a thundercloud. How do you get a rotating column of air? This happens when a wall of warm, moist air meets a wall of cool, dry air. When these air masses collide, the warmer air goes up and the cool air goes under. Updrafts of warm air can reach wind speeds of over 100 mph, sending the warm, moist air miles up into the sky before colliding with the cooler jet stream.

This movement of air masses can create huge rotating storm clouds called *supercells*, resulting in severe weather—high winds, lightning, thunder, heavy

**Jet stream**—A meandering high-speed wind current, generally moving from a westerly direction at speeds often exceeding 250 miles per hour at altitudes of 10 to 15 miles



Idealized view of a “classic” supercell, looking west

• The most costly tornado was the Oklahoma City area tornado of May 3, 1999, with over \$1 billion in damage.

• The same twister boasts the highest recorded wind speed near a tornado, at 318 mph.



## Twister Alert!

**Tornado safety starts with knowing that a tornado is on its way, so stay informed and have a plan. If a twister is coming and you're in a building . . .**

- **Find shelter!** If there is no basement, choose a closet, bathroom, or windowless room on the lowest floor, close to the center of the structure.
- **Take cover!** If you can, get under something sturdy. Make sure nothing heavy can fall on you. Crouch facedown, and cover the back of your neck and head with blankets, pillows, or your hands to protect yourself from flying objects—glass, metal, 2x4s, etc.
- **Keep them closed!** Opening doors and windows does not prevent damage, and exposes you to flying debris.

rains, and possibly hail (as moisture freezes in the upper atmosphere).

Meteorologists call the rotation in a supercell a *mesocyclone*. When this circular motion is picked up on radar screens, the NWS issues a tornado warning, which means that tornados could form and/or that one has been spotted on the ground.

Clouds swirling with rotating funnel clouds hanging down indicate that a tornado could form at any moment. Winds blowing in opposite directions around a strong updraft start a narrow, violent whirl. As centrifugal force throws the air away from the

center, it leaves a core of very low pressure, which acts as a powerful vacuum.

The first sign of a tornado may be a strong whirlwind of dust from the ground's surface. Often, at the same time, a short funnel grows from the storm cloud above it. The funnel becomes more organized, connecting with the rotating column on the ground—and a tornado is born.

• The usual tracking speed of a twister is 35 mph, but some have reached 65 mph.

### Tracking the Beast

With Doppler radar linked to a bank of computers, the NWS has the capability of detecting supercell thunderstorms and tracking their movement. Doppler radar runs in two modes. In one, the storm reflects energy back to the radar showing how intense the storm is. The second is much like police radar—a beam is sent out and bounces back with a different frequency. The change in frequency allows the radar to determine movement toward or away from the radar, thus detecting rotation in the supercell.

The NWS also utilizes data from weather satellites. But even with all these up-to-date methods and equipment, human beings are still a vital part of severe weather prediction and early warning. People are needed to interpret the information, and storm spotters and chasers are needed at the scene.

Spotters and chasers? These aren't just thrill-seekers out to see how close they can get to a tornado without being swallowed up. These people have been trained to assess the elements of supercells and identify tornadoes as they form. Spotters follow storms to watch for this development. They have also been taught how to "chase" a storm, while leaving themselves an escape route should the monster winds turn toward them.

This exciting and dangerous aspect of weather watching plays an integral part in the safety of many communities. The spotters and chasers relay their information to the National Weather Service, which turns it into reports and broadcasts these updates on the emergency broadcasting network and National Oceanographic and Atmospheric Administration (NOAA) weather radio stations.

• The average number of tornados per year in the United States: 1,000.

# Tornadoes' Weird Ways

Here are some strange-but-true tales from the Missouri tornadoes:



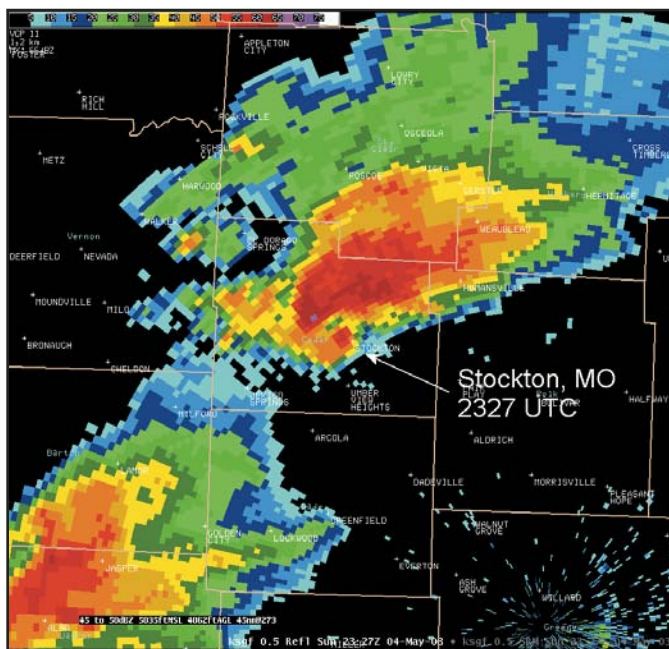
- A china hutch was left untouched in a house that was otherwise leveled to its foundation.
- Items were carried over 100 miles away and then deposited unharmed.
- A semitrailer truck was emptied of its load, lifted over 300 feet into the air, and set down without damage.
- Cattle were moved to neighboring fields.
- A grand piano was carried a quarter of a mile.
- Mature trees were uprooted and planted in the middle of paved roads.
- Straws were driven into trees, and boards were pounded several feet into the ground.

• The tallest tornado, at 10,800 feet, occurred in the Unita Mountains of Utah.

## The Shape of Things to Come

The spring of 2003's deadly tornado spree makes you wonder, What will this year be like? Let's hope it won't be as bad as May 2003.

Mike Hudson says, "2003 certainly was a very extreme year. But you can look back to the 1950s. You can look back to 1965, 1974—there are other years in our climatology that also were extreme severe weather years. On May 4, 1977, there was actually a bigger tornado outbreak right here around the Kansas City area than May 4, 2003, had," he says.



NWS Doppler radar view

According to Hudson, in order to identify a trend toward more active or severe weather, you must look at long periods of time—30 to 40 years.

Accurate long-range forecasts are difficult because weather itself is *volatile*—subject to change at any time. By taking a collection of data on present weather, using mathematical equations and physics, observing global weather conditions such as ocean temperatures, and including the personal experience of forecasters, meteorologists make the best projections they can. However, even the most careful predictions may not end up being accurate.

## Looking Ahead

Back in the town of Stockton, MO, the sun is shining. The heat of summer softens the memory of the monster tornado that swept through this sleepy town not that long ago. Residents are still cleaning up debris and rebuilding their homes. When the coming spring begins to brew up another season of supercell thunder storms, you can be sure that

they will be keeping a "weather eye" open for another twister. But meanwhile, life goes on and life is good.

• Big, fat tornadoes aren't always the strongest.

Adapted from an article by Leslie J. Wyatt